SUMMARY OF THE INVENTION

[0016] It is the object of the present invention to provide a teat rubber which has improved properties with regard to natural and species-appropriate milking, which allows the teat rubber of the type specified at the beginning to be easily applied, which adheres well to the teat and which does not strangulate the inner annular fold (Fuerstenberg'schen Venenring).

[0017] This object is achieved by a teat rubber of the type specified at the beginning, which is characterized in that the teat rubber comprises an adhesion element that improves the adhesion between the teat (190) and the teat rubber without affecting the milking process.

[0018] In an embodiment, the adhesion element is realized by a pre-stressing element which exerts a radially effective force on the planar teat bearing section. By means of the elastic pre-stressing means, it is achieved that sufficient pressure will always be applied to the teat so that the sealing and holding function will be guaranteed.

[0019] In another embodiment, the pre-stressing element is implemented such that it is able to cause a reduction of the radius of the insertion opening. Additional pressure can thus be applied to the teat via the planar teat bearing section so that the adhesion between the teat rubber and the teat will be improved.

[0020] In a further embodiment, the pre-stressing element comprises an annular element. The annular element encompasses an area around the planar teat bearing section and produces the additional pressure in this way.

[0021] In a further embodiment, the annular element is produced from a resilient plastic material, preferably rubber, or from metal, preferably a spring steel. These materials are advantageous insofar as they are easy to process and insofar as they can have a high strength on the one hand and resilient properties on the other.

[0022] In still another embodiment, the annular element is arranged on an inner wall of a cavity in the head part of the teat rubber.

[0023] In a further embodiment, a boundary of the planar teat bearing section has formed thereon a first projection which is directed towards the cavity and which prevents the annular element from slipping off.

[0024] In a further embodiment, the inner wall of the cavity has formed thereon a second projection adjacent said first projection in such a way that the space between said first and second projections forms a groove which accommodates the annular element.

[0025] Said first and second projections bring the annular element to the desired pressure-exerting position.

[0026] In a further embodiment, the annular element is arranged on an outer wall of the head part of the teat rubber. The area via which the prestress of the annular element is transmitted to the resilient teat rubber can thus be enlarged. In addition, the annular element is more easily accessible.

[0027] In still another embodiment, the annular element is provided with a folding mechanism by means of which said annular element can be changed over between two cross-sections. The cross-section of the insertion opening can thus be varied such that the teat can easily be inserted and that

sufficient adhesion and leak tightness will be achieved during milking.

[0028] In a further embodiment, the folding mechanism comprises hinge portions so that a subarea of the annular element can change between a folded and an unfolded condition, when pressure is radially applied to the annular element. Making use of this embodiment of the annular element, it is possible to simultaneously hold the milking cup and change the radius of the annular element with one hand. This will facilitate insertion of the teat in the teat rubber.

[0029] In a further embodiment, the outer wall of the head part comprises at least two depressions with different outer diameters in which the annular element can be arranged in a displaceable manner so that the cross-section of the insertion opening can be varied. The ring can thus be positioned at these two locations with the depressions which are provided in the head part and which have different outer diameters. The cross-section of the resilient insertion opening can be varied in this way, and adapted to various teat sizes in each individual case.

[0030] In another embodiment, the pre-stressing means comprises resilient lamellae which are arranged between the teat bearing section and the head part. A defined pressure can thus be applied to the teat.

[0031] In still another embodiment, the lamellae are arranged radially. This allows the application of a radially uniform pressure.

[0032] In another embodiment, the radially arranged lamellae are implemented such that they comprise a Y-shaped

bifurcation in the radial direction. This will lead to a particularly uniform distribution of pressure.

[0033] In another embodiment, the subareas of the planar teat bearing section are movable in a radial direction. This allows an adaptation to various teat sizes.

[0034] By means of the planar teat bearing section, the pressure applied to the teat is reduced so as to protect the teat, and the adhesion and sealing properties are enhanced at the same time. The subareas that are movable relative to one another will improve the adaptability to various shapes and sizes of the teat. It is, for example, possible to expand the insertion opening, since an angle between the sealing lip and the planar teat bearing section, which defines an enlarged boundary, is variable. The shape and the opening angle of the teat insertion opening can thus be varied and implemented such that it will be more easily adaptable to various shapes of teats and directions of insertion. The teat can be introduced more easily.

[0035] In a further embodiment, subareas of the planar teat bearing section are therefore movable with respect to an angular position relative to the sealing lip. This allows an adaptation to various teat shapes.

[0036] In another embodiment, the movability of the subareas of the planar teat bearing section relative to one another and relative to the sealing lip is achieved by the use of a soft, resilient material. The use of this material will increase the animal's well-being during the milking process and a higher yield will be obtained.

[0037] In another embodiment, the elastic material is latex or silicone rubber. These materials exhibit a particularly

high degree of adaptability and are, in addition, extremely skin friendly so that this will in particular improve the cow's well-being.

[0038] In another embodiment, the movability of the subareas of the planar teat bearing section is achieved by overlapping segments. This will improve the adaptability to various teat diameters, whereby the vacuum in the suction connecting piece will be sealed off from the surrounding air in a particularly effective manner.

[0039] In another embodiment, the above-mentioned segments are resiliently interconnected. This represents an alternative realization for the movability of the subareas of the planar teat bearing section in the case of which a particularly high variability of the insertion opening is achieved.

[0040] In another embodiment, the subareas of the planar teat bearing section are interconnected by a constriction and/or a portion of reduced material thickness, whereby the movability of the subareas relative to one another is achieved.

[0041] In another embodiment, the subareas of the planar teat bearing section are interconnected by a section whose material properties have been changed. This is another possibility of obtaining a movable connection between the enlarged boundary and the sealing lip.

[0042] In another embodiment, the subareas of the planar teat bearing section are interconnected through portions consisting of a material that is softer than the material of said subareas. A movable connection can be established e.g. by locally treating the sealing lip and/or the planar teat bearing section with plasticizers.

[0043] In another embodiment, the head part of the teat rubber has predetermined bending points, said predetermined bending points leading to a deformation of the head part, when a pressure difference between the pulsation chamber and the surroundings is generated. The inner surfaces of the teat rubber obtained by this structural design are particularly easy to clean.

[0044] In still another embodiment, the predetermined bending points are arranged such that the planar teat bearing section on the head part is adapted to be moved alternately towards and away from the pulsation chamber in accordance with a change of pressure. These predetermined bending points favour movements of the teat cup in vertical and lateral directions relative to the teat, whereby the teat and the udder will be massaged.

[0045] In another embodiment, the teat bearing section is releasably connected to the head part. This allows a replacement of the enlarged boundary e.g. by a boundary having a different diameter for better adaptation to other teat shapes.

[0046] In another embodiment, the releasable teat bearing section is implemented as a resilient formed part having a shape similar to that of a hollow cylinder and including in the outer surface thereof a circumferentially extending indentation which is adapted for engagement with the sealing lip. A reliably fixed, but nevertheless releasable enlarged boundary will be obtained in this way.

[0047] In a further embodiment, an inner width of the outer, circumferentially extending indentation exceeds the thickness of the sealing lip so that a movable connection can be established between the teat bearing section and the

sealing lip. This has the effect that a wedge-shaped gap is formed between the sealing lip and the enlarged boundary, which is implemented as a resilient formed part having a shape similar to that of a hollow cylinder and including a circumferentially extending indentation in the outer surface thereof.

[0048] In still another embodiment, a part of the insertion opening has a conically tapering surface, which conically tapers towards the inner side of the teat rubber in such a way that the inner annular fold (Fuerstenberg'sche Venenring) (150) located on the upper end, i.e. the base of the teat cannot come into contact with the teat rubber, and that pressure cannot be applied thereto, not even if the milking cup should shift in the direction of the udder. Furthermore, an effect will be produced in the case of which the lower edges of the planar teat bearing section move towards the teat, when the teat rubber slips inadvertently downwards and off the teat. The insertion opening will thus become narrower and the adhesion between the teat rubber and the teat will improve. These advantages will make it possible to solve, in combination with this feature, the above-mentioned problems by a teat rubber of the type specified at the beginning.

[0049] In another embodiment, the boundary of a wide opening of the conically tapering insertion opening is followed by an udder bearing surface by means of which the teat with the inner annular fold or with parts of the udder can be prevented from being drawn into the teat rubber by a milking vacuum, when the udder shrinks during the milking process, so that said inner annular fold cannot enter the narrow, pressure-exerting area of the teat rubber.

[0050] Another embodiment specifies that, when seen in a cross-sectional view, a conically tapering surface of the conically tapering insertion opening is concave, convex or linear.

[0051] In another embodiment, a transition between the conically tapering surface and the planar teat bearing section and the udder bearing surface, respectively, is implemented in a hingelike manner. The hinges will intensify an effect of the conically tapering surface in the case of which the lower edges of the planar teat bearing section move towards the teat, when the teat rubber slips inadvertently downwards and off the teat. The insertion opening will thus become narrower and the adhesion between the teat rubber and the teat will improve.

[0052] In another embodiment, the hingelike transition between the conically tapering surface and the planar teat bearing section and the udder bearing surface, respectively, comprises a portion of reduced material thickness, an indentation or a variation of the material properties in comparison with the properties of the adjoining material, so that the transition will assume hingelike properties.

[0053] In another embodiment, at least a part of the planar teat bearing section and/or of the inner surfaces of the suction connecting piece has cushioned surfaces. The teat contact areas of the teat rubber will thus encompass the teat in a particularly gentle manner and a more natural milking process will be achieved.

[0054] In still another embodiment, the cushioned surface consists of a foamed elastomer. This leads to an advantageous change of the resilient properties of the elastomer for the milking process and to a reduction of weight.

[0055] In still another embodiment, the foamed elastomer is a foam silicone. Silicone is known to be particularly skin friendly and, due to the foaming, the resilient properties of said material will be improved and the weight will be reduced.

[0056] In another embodiment, the foamed elastomer is sprayed onto the surface of the component in question.

[0057] In another embodiment, the whole planar teat bearing section and/or the suction connecting piece consist of the foamed elastomer.

[0058] The two last-mentioned embodiments are alternative embodiments that can be chosen depending on whether an optimized weight or a higher stability is to be achieved. However, hybrid forms are imaginable as well, in the case of which the parts of the teat rubber which are subjected to particularly high stress are implemented such that an optimum durability will be achieved, i.e. as non-foamed components, and the parts that are in intensive contact with the skin and subjected to little stress are implemented as skin-friendly and weight-optimized, i.e. foamed components.

[0059] In still another embodiment, the cushioned surfaces are implemented as cushioned pockets. The term pocket stands here for areas which are raised relative to the adjoining areas. Such pockets will be advantageous, when a particularly thick cushion is to be provided on the teat bearing surfaces alone, without impairing the stability and the durability.

[0060] Alternatively to or in combination with the foamed pockets, the cushioned surfaces are implemented as a fluid-filled pad, in particular as a gas-filled pad. A gas-filled pad has the advantage that the size and the resistance of the

pad can be adjusted by varying the pressure. This will improve the flexibility in the case of different teat sizes.

[0061] In still another embodiment, the cushioned pocket or the fluid-filled pad is a replaceable insert. The cushioned pocket or the gas-filled pad can thus be replaced easily, if the pad/cushion should be damaged. Furthermore, pads/cushions of different sizes can be used, depending on the respective teat size; this will increase the flexibility of the system. The replaceable insert can again by implemented as an annular component and with a suitable elasticity, so as to improve the adhesion of the teat rubber.

[0062] It should be pointed out that the above-mentioned features can be combined, individually or in combination, with a teat rubber of the type specified at the beginning.